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10/528,342	10/28/2005	Hans-Jurgen Tolle	32860-000862/US	4634

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EXAMINER
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DESAI, NAISHADH N

ART UNIT	PAPER NUMBER
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2834

MAIL DATE	DELIVERY MODE
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09/26/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

**Office Action Summary**

Application No.

10/528,342

Applicant(s)

TOLLE ET AL.

Examiner

Naishadh N. Desai

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 03/18/2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-25 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03/18/2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>03/18/2005</u> .  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Information Disclosure Statement***

1. The information disclosure statement (IDS) submitted on 03/18/2005 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

### ***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1 and 10 are rejected under 35 U.S.C. 102(b) as being anticipated by Link et al (US 5664916).

3. As per independent claim 1:

A redundant cooling device for an electric submarine drive motor, comprising (Fig 2 of Link et al shows redundant cooling circuits in a machine):

a first cooling circuit and a second cooling circuit (Fig 2 of Link et al shows the two cooling circuits), adapted to transport thermal energy away from the electric submarine drive motor, wherein coolant of the first cooling circuit and coolant of the second cooling circuit are adapted to flow in counter current(Fig 2 of Link et al) through a stator cooling ring of the electric submarine drive motor, in a region of the electric submarine drive motor (abstract of Link et al).

4. As per dependent claim 10:

Link et al discloses the use of air as coolant (Col 2 lines 27-29 and 37-38).

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 2,4,5,11,19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Link et al (US 5664916) in view of Lehman (US 4313309).

6. As per dependent claim 2:

Figure 2 of Lehman shows a main (high stage pump) and a minor (low stage pump). It is well known to those skilled in the art for the low stage device to have considerably lower power than the high stage device. The Lehman only discloses a single circuit, but

it is well known to those skilled in the art to duplicate the parts of the first circuit and arrange them in a second circuit.

Link et al teaches the use of counter flowing cooling circuits. Link et al do not explicitly show the pumps used for cooling. Lehman teaches the use of high and low stage compressors to be used in cooling circuits. It would have been obvious to a person having ordinary skills in the art at the time the invention was made to modify the device of Link et al to show both main and minor pumps in the cooling circuits.

The motivation to do so would be that it would allow for cooling to extreme temperatures and result in a significant reduction of consumption of electric power (abstract of Lehman).

In regards to claim 2, Link et al and Lehman discloses the claimed invention except for the multiplicity of circuits. Nonetheless it would have been obvious to one having ordinary skills in the art at the time the invention was made to duplicate the cooling circuits of Link et al and Lehman since it has been held that mere duplication of parts has no patentable significance unless a new and unexpected result is produced.

In re Harza, 274 F.2d 669, 124 USPQ 378 (CCPA 1960).

7. As per dependent claims 4 and 5:

Figure 2 clearly shows that the low stage and high stage compressors can be operated independently and that both stages have on-off operating modes (abstract of Lehman).

8. As per dependent claim 11:

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Link et al and Lehman discloses the device as in claim 2 above. Lehman also teaches the use of a power supply and switching unit or control unit to be assigned to the cooling circuits. In regards to claim 11, Link et al and Lehman discloses the claimed invention except for the multiplicity of cooling branches. Nonetheless it would have been obvious to one having ordinary skills in the art at the time the invention was made to duplicate and add another cooling branch to the cooling circuits since it has been held that mere duplication of parts has no patentable significance unless a new and unexpected result is produced.

In re Harza, 274 F.2d 669, 124 USPQ 378 (CCPA 1960).

9. As per dependent claim 19:

Link et al discloses the device in claim 1 above. Link et al do not disclose the use of temperature sensor in the cooling circuits. Lehman teaches the use of a temperature sensitive probe (Col 4, lines 19-20 and 24-32).

It would have been obvious to a person having ordinary skills in the art at the time the invention was made to modify the device of Link et al to include the temperature sensor of Lehman. The motivation to do so would be that it would allow one to control the motors and compressors (Col 4 lines 25-32 of Lehman).

Claims 12-14, 16, 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Link et al (US 5664916) and Lehman (US 4313309) in view of McCabria (US 5196746).

10. As per dependent claim 12:

Link et al and Lehman discloses the device as in claim 2 above. Link et al and Lehman do not disclose the motors to be constant voltage and variable frequency motors.

McCabria teaches the use of variable speed constant frequency type motors. It would have been obvious to a person having ordinary skills in the art at the time the invention was made to modify the device of Link et al and Lehman with McCabria to use motors having a fixed supply voltage and frequency. The motivation to do so would be that it would eliminate the need to have separate supply voltage lines for the different motors.

11. As per dependent claim 13:

Fig 1 of McCabria shows the use of inverters (elements 54 and 290) in a cooling circuit to control the amount of cooling of the cooling fluid.

12. As per dependent claim 14:

Link et al clearly discloses a three-phase motor. Link et al do not explicitly disclose the use of a squirrel cage motor. It would have been obvious to a person having ordinary skills in the art at the time the invention was made to choose a three-phase motor of the squirrel cage type. The motivation to do so would be that the squirrel cage motor would be less expensive and require less maintenance.

13. As per dependent claim 16:

McCabria discloses the use of both a primary and auxiliary reservoir (Col 3 lines 22-25).

14. As per dependent claim 22:

Link et al and Lehman discloses the device as in claim 2 above. Link et al and Lehman do not disclose a non-return or one-way valve. McCabria shows in Figure1 the use of pressure sensitive one-way valves. It would have been obvious to a person having ordinary skills in the art at the time the invention was made to modify the device of Link et al and Lehman with the one-way valves of McCabria. The motivation to do so would be that it would prohibit leakage of fluid in the direction it came from and permit better control over direction of cooling fluid in the cooling circuits.

Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Link et al (US 5664916) and Lehman (US 4313309) in view of Twerdochlib (US 4766557).

15. As per dependent claim 20:

Link et al and Lehman teaches the device of claim 11 above. Link et al and Lehman do not show pressure independent flow governor. Twerdochlib teaches the use of a flow governor which is not dependent on pressure in Col 3 lines 4-5. It would have been obvious to a person having ordinary skills in the art at the time the invention was made to modify the device of Link et al and Lehman to have the pressure independent flow governor of Twerdochlib. The motivation to do so would be that it would allow for better control of the flow of fluid and pressure control in the cooling circuits.

Regarding the placement of parts, Link et al and Lehman discloses the claimed invention except for explicitly showing that the flow governor is upstream of the stator, inverter module and power supply and switching unit. It would have been obvious to one



having ordinary skill in the art at the time the invention was made to arrange the flow governor to be upstream of the stator, inverter module and power supply and switching unit, since it has been held that rearranging parts of an invention involves only routine skill in the art. *In re Japiske*, 86 USPQ 70.

Claims 3,5,15,24 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Link et al and Lehman as applied to claim 1 above and further in view of Wiedemann (US 3089969).

16. As per dependent claim 3:

Figure 1 of Wiedemann shows two motors driving two separate pumps. It is well known to those skilled in the art for motors driving separate circuits to have independent supply voltages. Link et al and Lehman teaches the device per claim 1 above. Link et al and Lehman do not explicitly disclose the supply voltages to be independent for the cooling circuits' motors or pumps. Wiedemann shows two cooling circuits to have two separate motors.

It would have been obvious to a person having ordinary skills in the art at the time the invention was made to modify the circuits of Link et al and Lehmann with the teachings of Wiedemann to show the motors having separate supply voltages. The motivation to do so is that it is well known to those skilled in the art to have independent supply voltages for independent circuits and to allow for continued operation of the device without any interruption.

17. As per dependent claim 5:

Lehman teaches the control unit to be able to run the cooling circuit on the high stage above the low speed range of the low stage.

It would have been obvious to one having ordinary skills in the art at the time the invention was made to make the high stage device run above the low speed range of the apparatus, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

18. As per dependent claim 24:

Lehman teaches the control unit to be able to run the cooling circuit on the low stage independently of the high stage.

19. As per dependent claim 25:

Lehman teaches the control unit to be able to run the cooling circuit on the high stage independently of the low stage.

20. As per dependent claim 15:

Link et al and Lehman teaches the device of claim 2 above. Link et al and Lehman do not show the motors to have independent supply voltages. Wiedemann in Figure 1 shows the two cooling circuits to have two separate motors (main and minor). It is well known to those skilled in the art to have independent power supplies for the two independent motors shown in Figure 1 of Wiedemann. It would have been obvious to a

person having ordinary skills in the art at the time the invention was made to modify the device of Link et al and Lehman with the independent supply voltages of the motors in Figure 1 of Wiedemann. The motivation to do so would be that it would provide a more robust and reliable cooling circuit and allow for the device to run without interruption from the other motors.

Claims 6,8, 17 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Link et al in view of Amaral et al (US 6901765).

21. As per dependent claim 6:

Figure 1 of Amaral et al clearly shows coupling valves that are arranged in transfer lines between the two cooling circuits. Link et al teaches the device as in claim 1 above. Link et al does not explicitly show the coupling valves. Amaral et al clearly shows the use of coupling valves in a redundant cooling circuit. It would have been obvious to a person having ordinary skills in the art at the time the invention was made to modify the device of Link et al with the coupling valves of Amaral et al. The motivation to do so would be that it would provide better control of coolant flow in the circuits.

22. As per dependent claim 8:

Amaral et al discloses the claimed invention except for the parts to be arranged on the upper part of the cooling circuit. It would have been obvious to one having ordinary skill in the art at the time the invention was made to arrange the parts of the cooling circuit

on the upper part of the drive motor, since it has been held that rearranging parts of an invention involves only routine skill in the art. *In re Japiske*, 86 USPQ 70.

23. As per dependent claim 21:

Link et al teaches the device as in claim 1 above. Link et al does not explicitly show the temperature controlled three-way valve. Amaral et al clearly shows the three-way valve in the heat exchanging cooling circuit in Figure 1. It would have been obvious to a person having ordinary skills in the art at the time the invention was made to modify the device of Link et al to include the three-way valve of Amaral et al. The motivation to do so would be that it would allow one to connect, redirect and control more cooling paths.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Link et al and Amaral et al (US 6901765) in view of Lehman (US 4313309).

24. As per dependent claim 7:

Link et al and Amaral et al disclose the device as in claim 6 above and to vary the circulation of the cooling circuits. Link et al and Amaral et al do not disclose the output power of the drive motor to be adaptable to the amount of removable heat. Lehman discloses that the operation of the low stage is always intermittent due to the changing temperature, which equates to amount of removable heat. It would have been obvious to a person having ordinary skills in the art at the time the invention was made to modify the device of Link et al and Amaral et al to have the output power of the motor being adaptable to the amount of removable heat. The motivation to do so would be that it

would reduce the power consumption and minimize the duration which the motors need to be operated (Col 1 lines 32-39 of Lehman).

Claims 9 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Link et al in view of Rowe (US 6596175).

25. As per dependent claim 9:

Link et al disclose the device as in claim 1 above. Link et al do not disclose the cooling circuit to have an inverter circuit module. Figure 1 of Rowe shows the cooling circuit to have a rectifier element which is directly cooled by the cooling circuit. It would have been obvious to a person having ordinary skills in the art at the time the invention was made to modify the device of link et al to modify the device of Link et al to include the inverter circuit of Rowe. The motivation to do so would be that it would prevent the rectifier or inverter unit from overheating and to operate it under a stable temperature for maximum efficiency.

26. As per dependent claim 17:

Link et al disclose the device as in claim 1 above. Link et al do not disclose the cooling circuit to have a degassing device or a service connection. Rowe teaches the use of both a degassing device and a service connection. Figure 1 of Rowe shows the reservoir tank to have a vent and element 40 to be a flow valve, which can be manually operated to allow a technician to periodically inject carbon dioxide to clear the strainer (Col 5 lines 1-6 of Rowe). It would have been obvious to a person having ordinary skills

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in the art at the time the invention was made to modify the device of Link et al to include the degassing device and the service connection of Rowe. The motivation to do so would be that it protect the system from developing too much pressure and improve the lifespan of the system by allowing to manually service and monitor it under regular intervals.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Link et al in view of Liebe (US 3936681).

27. As per dependent claim 10:

Link et al disclose the device as in claim 1 above. Link et al do not disclose the coolant in the cooling circuits to be re-coolable by using sea water in a water-water heat exchanger. Liebe discloses that the coolant is recoolable by the coolant(which is either air and or water (Col 1 lines 12-21)) interacting with the sea water (Col 3 lines 5-11). It would have been obvious to a person having ordinary skills in the art at the time the invention was made to modify the device of Link et al to have the coolant re-cooled as Liebe discloses. The motivation to do so would be that it would keep the coolant cool and therefore reduce the heat of the apparatus, which would lead to a more efficiently running apparatus.

Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Link et al in view of Twerdochlib (US 4766557).

28. As per dependent claim 18:

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Link et al disclose the device as in claim 1 above. Link et al do not disclose the cooling circuit to have a pressure relief valve. Twerdochlib teaches the use of a pressure regulator in figure 1 and Col 3 lines 4-5. It would have been obvious to a person having ordinary skills in the art at the time the invention was made to modify the device of Link et al to include the pressure regulator of Twerdochlib. The motivation to do so would be that it would allow one to maintain proper pressure range of the fluid (Col 3 lines 1-3 of Twerdochlib).

Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Link et al in view of Mantovani (US 4916341).

29. As per dependent claim 23:

Link et al disclose the device as in claim 1 above. Link et al do not disclose the cooling circuit to have quick action couplings or connectors. Mantovani teaches the use of quick couplings to connect and disconnect rapidly and easily (Col 2 lines 1-2). The use of quick couplings are very well known to those skilled in the art. It would have been obvious to a person having ordinary skills in the art at the time the invention was made to modify the device of Link et al to include the quick couplings devices of Mantovani. The motivation to do so would be that it would allow one to connect and disconnect the cooling lines as needed and that it would improve maintenance access to cooling lines.

### ***Conclusion***

30. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Lynch et al teaches an quad shaft contra-rotating homopolar motor. Crowe teaches a dual cooling system. Kawakatu teaches a refrigerator. Kuriyama et al teaches a cooling system having plural cooling stages in which refrigerate-filled chamber type refrigerators are used. Kuchta teaches an apparatus for redundant cooling of electronic devices. Laskaris et al teaches a cryogenic cooling refrigeration system and method having open-loop short term cooling for a superconducting machine. Grant et al teaches a refrigerating system. Rowe teaches a method for treating stator cooling water to prevent clogging of strainer in the cooling system of an industrial electrical generator. Rennfeld et al teaches a coolant circuit. Willyoung teaches a flow surge equipment. Purman teaches a refrigerant cooled electric motor. Campolong teaches pumps with heat exchanger for pumping slurries. Matin et al teaches dynamoelectric machine with embedded heat exchanger. Heintz teaches a cooling method and apparatus.

31. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Naishadh N. Desai whose telephone number is (571) 270-3038. The examiner can normally be reached on M-F.

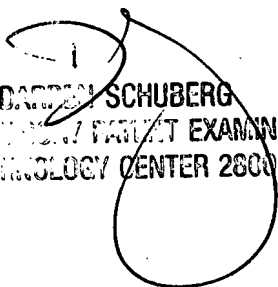
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Darren Schuberg can be reached on (571) 272-2204. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



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